

# Missouri Resources

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# director's comment

Missouri state parks and historic sites offer visitors some of the greatest opportunities to get outdoors and truly appreciate all of the beauty our state has to offer. The state park system has a proud tradition of preserving and interpreting the state's most outstanding natural landscapes and cultural features while providing a variety of recreational opportunities. This year, the Missouri Department of Natural Resources will commence the 100th anniversary celebration of Missouri State Parks.

A highlight of the festivities will be the grand opening of the 88th state park – Echo Bluff State Park. The park's name highlights the most prominent natural feature, a bluff made of Eminence dolomite. Visitors to the park in Shannon County will be able to explore Sinking Creek and the Current River. The park's amenities provide great opportunities for corporate retreats, special events like weddings and reunions, and other functions where organizers need formal space for meetings as well as the abundant recreational features. In addition, the park will feature several miles of hiking trails for visitors to enjoy during all seasons. The park, currently under development, is expected to open later this summer.

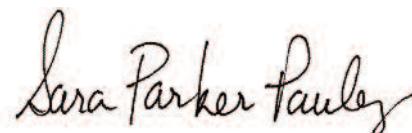
As Missourians, we play an impor-



tant role in developing and maintaining our first-rate state park system. Our state parks and historic sites are funded through the Parks, Soils and Water Sales Tax. The tax is placed on the ballot every 10 years to reaffirm the voter's support of the park system and soil and water conservation efforts. The Parks, Soils and Water Sales Tax comes up for a vote again this year. The department divides the revenue generated from the one-tenth-of-one-percent tax equally to maintain Missouri's state park system and soil and water conservation efforts. Learn

more about the history and benefits of the tax by visiting [dnr.mo.gov/env/swcp/history.htm](http://dnr.mo.gov/env/swcp/history.htm)

We invite you to explore and experience nature in Missouri's beautiful state parks. Learn more about its history by reading Missouri State Parks Celebrates 100 Years, in this issue of Missouri Resources. Continue to visit [mostateparks.com](http://mostateparks.com) to learn more about the exciting events planned during 2016 and 2017 to commemorate this centennial event. Then gather up your friends and family and make plans to explore and celebrate our Missouri state parks.

  
Sara Parker Pauley  
Missouri Department of Natural Resources

## Missouri Resources

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### Mission Statement

The mission of the Missouri Department of Natural Resources is to protect our air, land and water; to preserve our unique natural and historic places; and to provide recreational and learning opportunities for everyone.

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Editor  
**Stuart Westmoreland**

Design Director  
**Belinda Hughes**

Photographers  
**Ben Nickelson**  
**Andrew Richmond**

Assistant Editor  
**Andrew Richmond**

Circulation  
**Amber Sagerty**

Editorial Board  
**Larry Archer**  
**Andrea Balkenbush**  
**Hylan Beydler**  
**Renee Bungart**  
**Steph Deidrick**  
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## 2 Missouri State Parks Celebrates 100 Years

by Tom Uhlenbrock

One hundred years in the making, the Missouri state park system is a testament to the foresight of our state officials and the willing support of Missouri citizens. Today, Missouri State Parks is a shining example of what creativity, determination and cooperation can offer, for the benefit of all.

## 8 Jumpstarting a City's Heart

by Eva Dee Goss

St. Louis's historic Kiel Opera House, completed in 1934, closed its doors in 1991. Twenty years later, the storied venue had been revitalized, modernized and reopened as the Peabody Opera House. The incredible restoration took nearly 1,300 craftsmen 14 months to complete. Today, it books more than 200 shows a year.

## 14 Minerals in Everyday Life

by Hylan Beydler

It comes as no surprise that minerals – industrial, metallic or fuel – are critical to our economy. Less obvious is how many everyday benefits they provide, and how many everyday items that could not exist without them.

departments

**18 Explore Missouri 20 DNR News 22 Top Spots 25 ... But Not Least**

**Above:** Civilian Conservation Corps (CCC) workers at Dr. Edmund A. Babler Memorial State Park, in Wildwood, pose for a photo taken in the 1930s. Beginning in 1933, Congress authorized many federal public works programs like the CCC to help alleviate unemployment by providing jobs to young men. Many of Missouri's state parks benefited from CCC labor. *MoDNR file photo*.

**Front Cover:** Echo Bluff, the attraction for which Missouri's newest state park is named, in Shannon County. *DNR photo by Ben Nickelson*.

**Back Cover:** A cyclist rides Missouri State Parks' first pump track at Finger Lakes State Park, near Columbia. *DNR photo by Ben Nickelson*.

# Missouri State Parks Celebrates 100 Years

by Tom Uhlenbrock

**M**issouri is celebrating a century since the establishment of its park system, and the results are displayed proudly throughout the state.

State parks offer prairies, battlefields, covered bridges, ancient Indian villages, forested hills and valleys with caves and springs, streams with trout, lakes with bass and the homes and workplaces of honored artists, pioneers, soldiers and statesmen.

The Arrow Rock Tavern, founded as a rest stop for settlers heading West, was the first state park property. The newest is Echo Bluff State Park set to open summer 2016 near the Current River in Shannon County.

Bill Bryan, state parks director, said Echo Bluff will provide a base camp for families exploring the wonders of the Ozarks.

"From the banks of Sinking Creek, visitors will be able to hike

(Above) Early visitors to Johnson's Shut-Ins, which became a state park in 1955, enjoyed taking photographs of the iconic shut-ins. MoDNR file photo  
(Right) Today, guests of Johnson's Shut-Ins State Park in Reynolds County still enjoy exploring nature's water park.



MoDNR photo by Ben Nickelson

**"In 1917, when our nation was on the precipice of World War I, our state took the time to recognize the importance of state parks and historic sites."**

— Bill Bryan, Director, Missouri State Parks

the back country, float the world famous Current River and enjoy the nearby springs that make this part of the Ozarks a unique destination," Bryan said.

Public discussions and citizen support for Missouri's state park system began around the turn of the 20th century. In 1916 the National Park Service was founded to protect America's best wild places. Missouri followed suit the next year by creating a special state park fund that would enable the state to acquire land and make the fish and game department responsible for parks and historic sites.

"Our beginnings are quite a testament to the value Missourians place on the state park system," said Bryan. "In 1917, when our nation was on the precipice of World War I, our state took the time to recognize the importance of state parks and historic sites. They supported the idea that every man and woman should have a place to recreate and enjoy history, and that's an idea that continues to resonate nearly 100 years later."

Park funds initially came from game and fish fees, and caused officials to think in terms of lands for sporting uses, but citizen groups were eager to support their historic heritage as well. In 1923, the tavern that was built in 1834 in Arrow Rock was acquired by the state.

On Oct. 17, 1924, Big



MoDNR file photo



MoDNR photo by Tom Uhlenbrock

Spring State Park became the first Missouri state park. That park, Alley Spring State Park and Round Spring State Park later were recognized as being nationally significant and became part of the National Park Service's Ozark National Scenic Riverways.

By 1928, the state had 14 parks totaling nearly 40,000 acres, much of it in the Ozarks. Only four states had more acreage than Missouri, a stunning achievement

(Top) A car crosses the Current River at Montauk State Park in the 1930s.

(Above) Anglers cast their lines on the 2015 opening day of trout season at Montauk State Park.



## State Park System in Missouri

**1916** National Parks Service created

**1917** Mo. legislature establishes state park fund

**1923** State acquires historic Arrow Rock Tavern >

Arrow Rock State Historic Site



**1924** Big Spring State Park becomes Mo.'s first state park

Bennett Spring State Park

Mark Twain State Park

Mark Twain Birthplace State Historic Site

**1925** Legislature increases funding to support state park system

**1926** Montauk State Park

Sam A. Baker State Park

**1927** Meramec State Park

**1928** Roaring River State Park

**1932** Big Lake State Park

Van Meter State Park

Wallace State Park

Washington State Park

**1934** Lewis and Clark State Park

CCC workers in Missouri total 4,000



(Above left) Built in 1834, J. Huston Tavern at Arrow Rock State Historic Site is the oldest continuously operating restaurant west of the Mississippi.

This photo was taken in 1912. MoDNR file photo

(Above right) Visitors today can enjoy a cold drink in the mercantile store, otherwise known as the Tap Room, and dine in one of three dining rooms:

The Sappington Parlor, the Huston Room or the Bingham Room.

(Below) Civilian Conservation Corps workers construct a retaining wall at Arrow Rock State Historic Site in the 1930s.



MoDNR photo by Ben Nickelson



MoDNR file photo

credited to strong citizen support.

Bryan noted that the support has continued throughout the last 100 years.

"A century of citizen support has made our park system the envy of the nation," he said. "We have dedicated and sustainable funding that allows us to operate, maintain and improve the nation's best state park system," Bryan added.

### Icing on the Cake

Missouri was fortuitously poised in 1933 when President Franklin Roosevelt's New Deal looked for projects in state parks to provide jobs. Several thousand young men in crews of the Civilian Conservation Corps and Works Progress Administration were soon at work in Missouri state parks.

Nearly every park in the system at that time benefited from structures built by the crews. The largest construction projects centered at the federal recreation area created on the shoreline of the huge, newly created Lake of the Ozarks. The area later became a 17,000-acre state park, the largest in the system.

The late B.H. Rucker worked for Missouri State Parks for more than 40 years, and upon his retirement served as an unofficial parks historian. Rucker was interviewed for this article last fall, and died in

**1937** Dr. Edmund A. Babler Memorial State Park  
Big Oak Tree State Park  
Pershing State Park  
State Parks Board formed to oversee all parks

**1938** *Crowder State Park*>  
**1945** Voters approve mill tax with a portion for state parks

**1946** Cuivre River State Park  
Knob Noster State Park  
Lake of the Ozarks State Park  
**1952** Thousand Hills State Park  
Confederate Memorial State Historic Site  
Gen. John J. Pershing Boyhood Home State Historic Site



**1955** Hawn State Park  
Johnson's Shut-Ins State Park  
**1956** Lake Wappapello State Park  
**1957** Trail of Tears State Park  
*Harry S Truman Birthplace State Historic Site*>  
**1958** Battle of Lexington State Historic Site  
**1959** Table Rock State Park



**1960** Pomme de Terre State Park  
Wakonda State Park  
Boone's Lick State Historic Site  
**1961** First Missouri State Capitol State Historic Site  
Voters renew mill tax



January at the age of 76. Rucker said the CCC and WPA provided not just quantity, but quality.

"The CCC parks became our crown jewels," Rucker said. "They called the stone-and-timber structures 'parkitecture.' Those buildings came to define what a state park should look like."

"The park resources were already there. The CCC work was the icing on the cake."

## Building a Remarkable System

Following the 1937 constitutional amendment that separated game and fish management from the administration of state parks, the Missouri General Assembly established a state park board and appropriated limited general revenue funds for operations and development of state parks.

By 1938, nearly \$20 million had been invested in the park system, with the federal government providing the bulk of the funds. Missouri, with its superlative scenic resources, was able to build a remarkable number of parks with little state money.

An array of new parks entered the system, including the magnificent Johnson's Shut-Ins in 1955. During the next 15 years, Missouri created 26 new parks, many of them historic or archaeological sites and nearly all of them donations.

## Resources and Recreation

The rapid expansion created a dramatic increase in attendance, as the automobile and better highways made outdoor recreation available to everybody. State funding still was minimal, and Missouri, like most states, depended on federal aid to add new parks.

A reorganization of state government in 1974 resulted in creation of a consolidated, new agency, the Department of Natural Resources. Missouri State Parks became one of five divisions within the new department.

New emphasis was placed on protecting and interpreting natural and cultural re-

(Below) Campers at Roaring River State Park prepare to eat dinner at their campsite. MoDNR photo by Ben Nickelson

(Bottom) Missouri's state parks have a long history of being a destination for campers. This riverside campsite photo was taken sometime in the 1960s.



MoDNR file photo

**1964** Graham Cave State Park

St. Francois State Park

Watkins Mill State Park

Watkins Woolen  
Mill State  
Historic Site

**1965** Dunklin's Grave  
State Historic Site >

**1967** Elephant Rocks  
State Park



Rock Bridge Memorial  
State Park

Bollinger Mill State Historic Site

Hunter-Dawson State  
Historic Site

Towosahgy State  
Historic Site

Union Covered Bridge  
State Historic Site

**1968** Locust Creek Covered Bridge  
State Historic Site

Sandy Creek Covered Bridge  
State Historic Site

Battle of Pilot Knob State  
Historic Site

**1969** Stockton State Park

**1970** Felix Vallé House State  
Historic Site

Jewell Cemetery State  
Historic Site

Sappington Cemetery State  
Historic Site

**1972** Mill tax expires

**1973** Finger Lakes State Park

**1974** Dept. of Natural  
Resources created

(Below) Children enjoy Pickle Creek Trail at Hawn State Park, which follows a clear, sand-bottomed stream that rushes through a wooded valley.

(Bottom) Hikers enjoy Hawn State Park in the 1980s. Today, Missouri State Parks offer more than 1,000 miles of trails, contributing to the state's title of "best trails state."



MoDNR photo by Tom Uhlendorf



MoDNR file photo

sources, while still providing recreation. With this in mind, the system soon acquired Ha Ha Tonka State Park (1978), with its castle ruins and geologic features, and Prairie State Park (1980), the largest remaining remnant of tallgrass prairie in Missouri.

### Financial Crisis in the 80s

A financial crisis hit in the early 1980s when federal aid dried up and a nationwide recession forced the State of Missouri to cut budgets.

"In 1981, parks went broke – we had to shut down some parks that winter," Rucker

said. "It was the lowest time anyone could remember on the financial end."

A group of concerned citizens formed the Missouri Parks Association with the goal of finding a resolution to the funding crisis. The group is credited with a development by the mid-1980s that left parks poised for a remarkable renaissance.

"Out of that came the Parks and Soils Sales Tax," Rucker said. "The sales tax idea was probably one of the most significant things in the history of state parks. For the first time ever, we had some stable funding. You could plan on what to do next year, or over several years, toward reaching strategic, long-term objectives."

In August 1984, voters approved a one-tenth-cent sales tax to be split evenly be-

tween state parks and soil and water conservation efforts. The tax was to expire in only four years, but voters in November 1988 and 1996 renewed the tax. It has been renewed every 10 years since, and is set to expire if not renewed by voters in 2016.

"It is gratifying that each of the subsequent approvals was by huge voter majorities, indicating the love that Missourians have for their park system," Rucker said.

### Building Fund for Improvements

In a special election in June 1982, voters approved a \$600 million bond issue for capital improvements known as the Third State Building Fund.

The parks division gained nearly \$60 million from the fund, resulting in the largest building program since the New Deal in 1933. Most of the funding was com-

MoDNR  
assumes state  
parks oversight

**1975** Battle of Athens State  
Historic Site

**1976** Mastodon State  
Historic Site  
Harry S Truman State Park  
St. Joe State Park  
Missouri Mines State  
Historic Site  
Jefferson Landing State  
Historic Site



**1977** Dillard Mill State Historic Site  
Thomas Hart Benton Home and  
Studio State Historic Site

**1978** Ha Ha Tonka State Park  
Deutschheim State Historic Site

**1979** Robertsville State Park

**1980** Prairie State Park  
Weston Bend State Park

**1982** Onondaga Cave State Park

Voters approve bond issue for  
construction/renovation in  
state parks

**1983** Long Branch State Park  
Scott Joplin House State  
Historic Site

**1984** Grand Gulf State Park  
Osage Village State Historic Site

Voters approve Parks and Soils  
Sales Tax

**1987** Katy Trail State Park

**Opening summer 2016, Missouri's 88th state park will be an outdoor destination to experience all the Ozarks have to offer.**

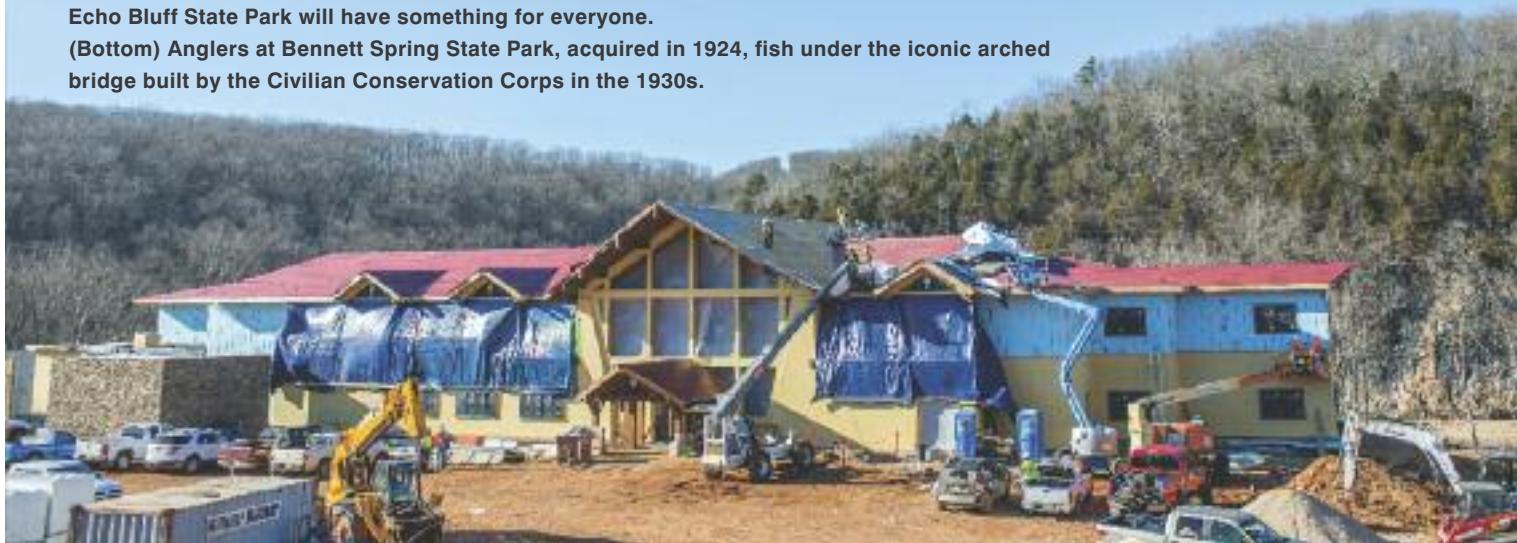
**Whether you prefer a rustic campsite, one of 62 full-service campsites or a night in the park's exemplary lodge,**

**Echo Bluff State Park will have something for everyone.**

**(Bottom) Anglers at Bennett Spring State Park, acquired in 1924, fish under the iconic arched**

**bridge built by the Civilian Conservation Corps in the 1930s.**

MoDNR photo by Ben Nickelson



mitted to restoring basic resources and the creation of some new facilities for visitors.

"By that time, we were deeply behind in lots of infrastructure issues," Rucker said. "The money allowed rehabilitation of old buildings, renewal of sewer and water systems, landscaping, roads and for visitor centers to display collections of historical and natural artifacts."

## The Future

With yearly attendance currently at more than 18 million, Parks Director Bryan, said the system's most compelling challenge is to remain relevant for future generations.

"As our country changes, and leisure time presents more options for people to choose from, we have to be attentive to the expectations of Missourians so their state parks remain a favorite destination.

"In addition to providing new opportunities, we have to do our very best to make sure everything Missourians love about their state parks stays the same." 

*Tom Uhlenbrock is a writer for Missouri State Parks.*

**"... the [park] system's most compelling challenge is to remain relevant for future generations."**

– Bill Bryan, Director, Missouri State Parks



MoDNR photo by Ben Nickelson

**1988** Voters renew Parks and Soils Sales Tax



**1990** Battle of Carthage State Historic Site

**1991** *Nathan Boone Homestead & State Historic Site*  
Taum Sauk Mountain State Park

**1992** Big Sugar Creek State Park

Ilinivek Village State Historic Site

**1996** Voters renew Parks and Soils Sales Tax

**1997** Route 66 State Park

**2000** Morris State Park

**2001** Edward "Ted" and Pat Jones - Confluence Point State Park

**2002** Clark's Hill/Norton State Historic Site

**2006** Voters renew Parks, Soils and Water Sales Tax

**2007** Current River State Park

**2008** *Battle of Island Mound State Historic Site*

**2010** State Parks Youth Corps program established

**2012** Rock Island Trail State Park



**2013**  
Don Robinson State Park  
Echo Bluff State Park

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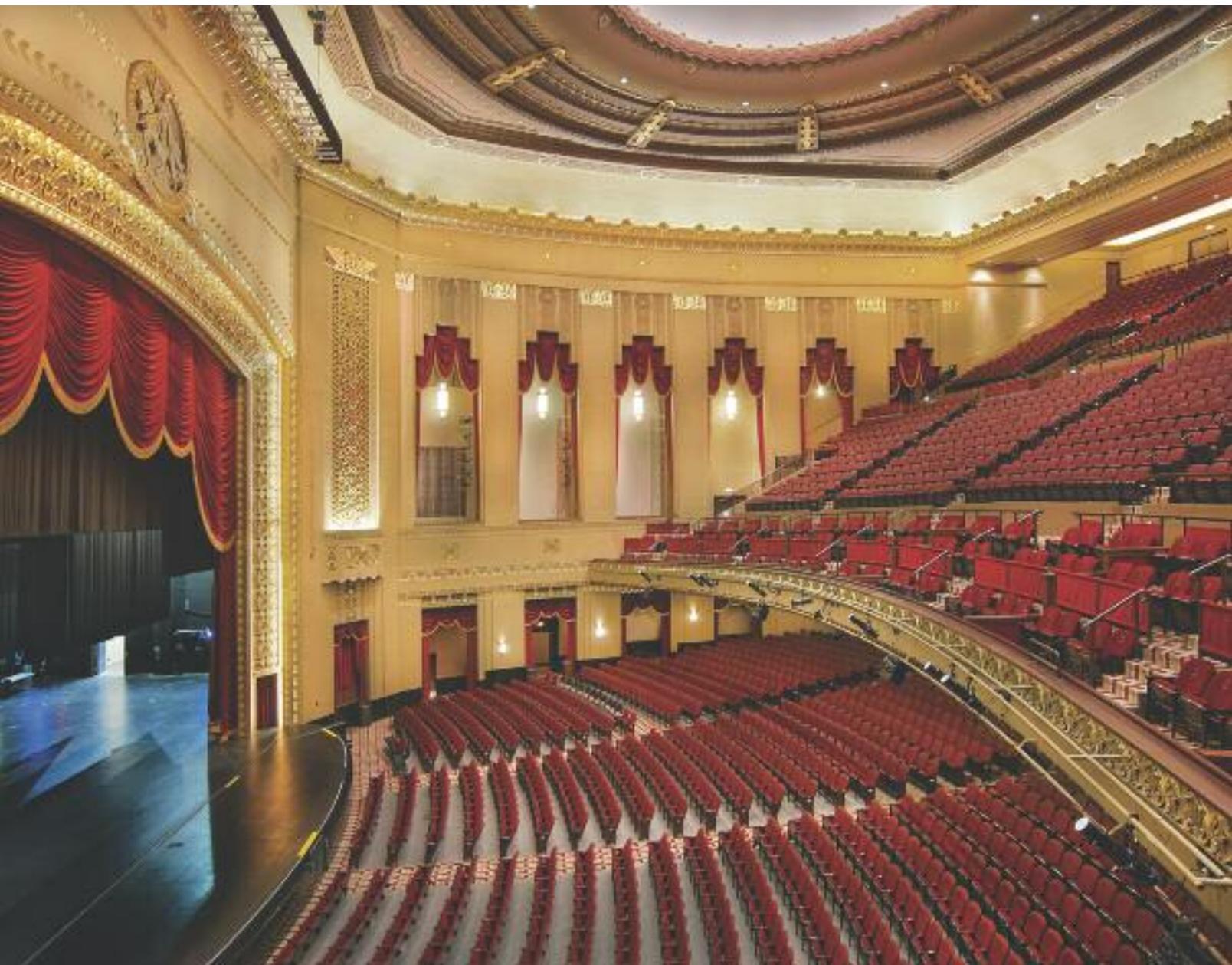
PEABODY OPERA HOUSE

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# Jumpstarting a City's Heart

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by Eva Dee Goss





All photos by  
Tom Paule Photography

The 80-year-old Kiel Opera House in St. Louis was rechristened as the Peabody Opera House in July 2010. Renovation, innovation and St. Louis-style determination were key players in transforming this crumbling megalith into a new powerhouse venue for the city.

The creative spirit behind its initial construction was St. Louis's "City Beautiful Movement." In a time when our country had many depression era woes, this stunning addition helped the people of St. Louis regain hope that things would soon be better and gave them renewed pride in their city. Completed in 1934, this city-block-sized art deco structure perfectly combined grace, marble and Old World style.

One can imagine the excitement in downtown St. Louis – the city buzzing with opening night expectations. Visitors vividly recall how the high vibrato tones of Elizabeth Rethberg rang out into the evening streets as she warmed up her voice to perform her role in the classic Italian opera *Aida*.

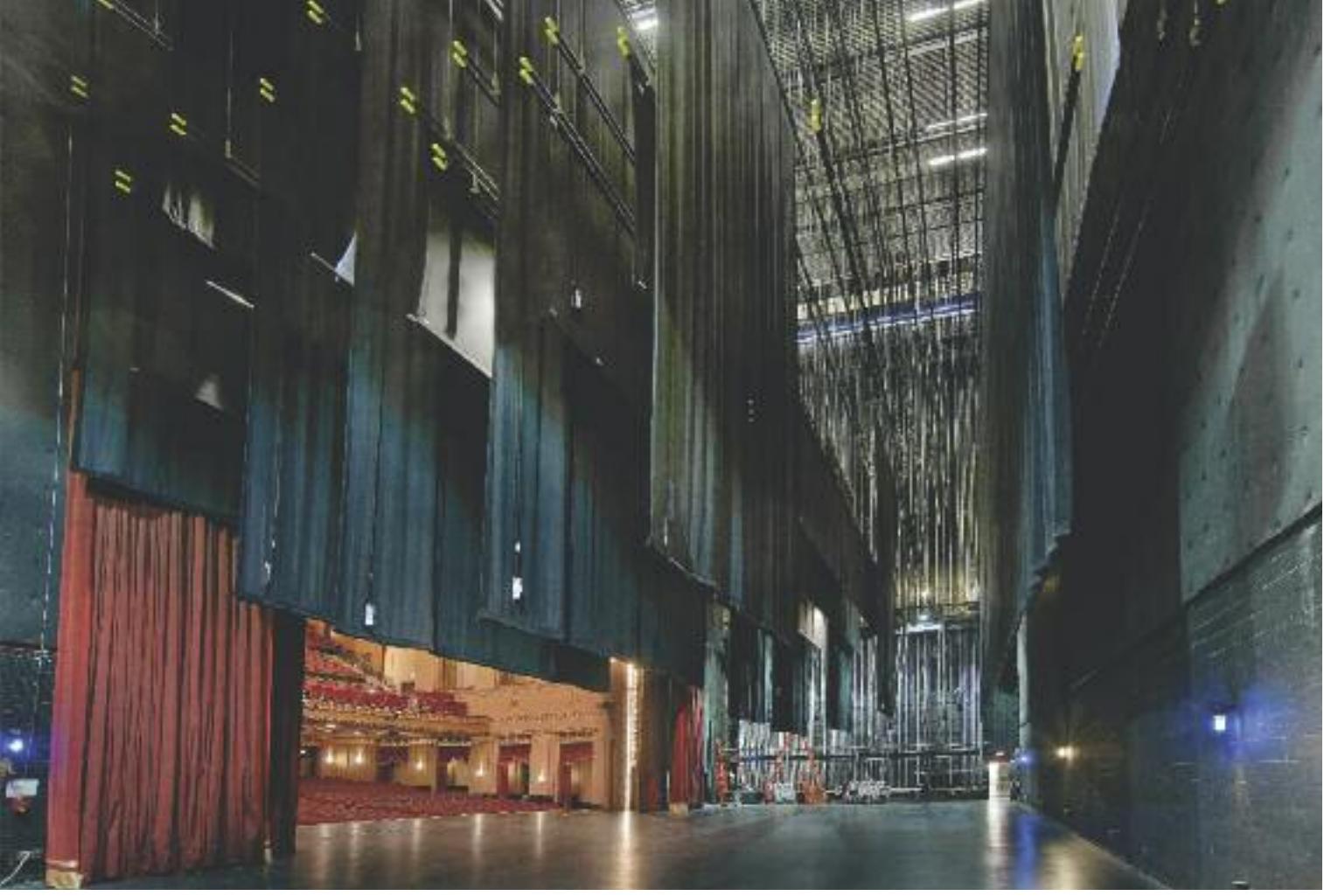
Over the years, this venue featured an eclectic blend of world-famous performers from the musical stylings of big-band leader Duke Ellington to the rock-your-socks-off riffs of Bruce Springsteen. Its stages were also host to many top-rated Broadway shows, such as: *The King*



(Opposite page) The revamped interior of the Peabody Opera House has been fully restored after being shuttered for more than 20 years.

(Top) The Peabody Opera House lights up St. Louis's downtown with a combination of Old World elegance and modern flare.

(Above) The Kiel Club is a charming place to socialize before attending a performance. Keeping the Kiel Club name and restoring the classic atmosphere of this lounge was done in homage to the origins of this special space.



Behind the stage is a fully functional modern theater. This stage has played host to thousands of performances over the years, showcasing an eclectic mix of world-class performers.

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**VISITORS RECALL HOW**  
**the high vibrato tones of Elizabeth Rethberg**  
**rang out into the evening streets**  
**as she warmed up her voice to perform her role in**  
**the classic Italian opera *Aida*.**

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*and I, The Wiz and Hair.* There was a real sense of community when one looked at the schedule of events because there was something for everyone on the lineup.

Originally, the building had two distinct regions – the opera house and the auditorium. The Kiel Auditorium was torn down in 1990 and replaced with a brand new hockey arena, specifically designed to house the St. Louis Blues hockey team. The name of this arena has changed a few times since its

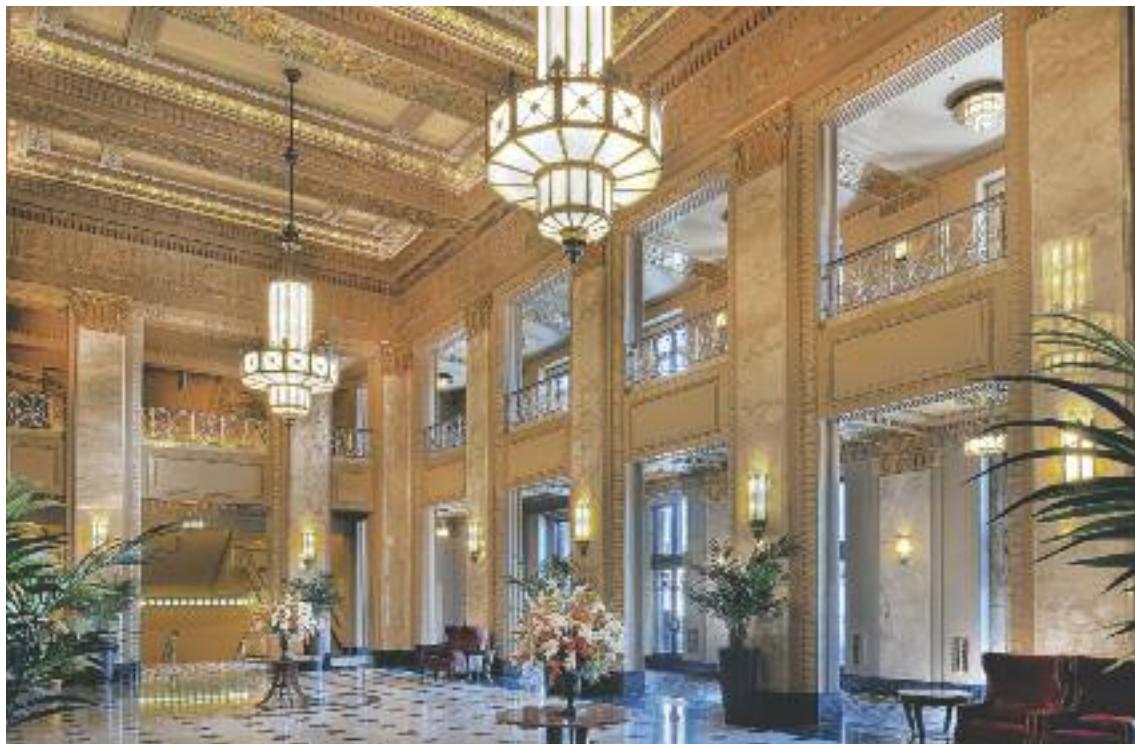
completion in 1992. To date, its name has been the Kiel Center, the Savvis Center and is currently named the Scottrade Center.

The opera house had a successful run of more than 60 years, but in 1991, a final performance by the St. Louis Philharmonic ushered out this grand beauty's reign. The opera house closed and stayed dark until 2011. The primary reason for its closure was finances. The city's throng had moved away from the central city area and crowds of paying concert attendees were drawn to newer venues set in suburban areas that were perceived safer, and closer to home.

One obvious example of this change in cultural preference was the opening and quick success of the Riverport Amphitheater – currently named the Hollywood Casino Amphitheater. Located in Maryland Heights, this venue opened the same year the Kiel Opera House closed, in summer 1991.



(Left and below) The Grand Lobby required much work to bring it back to its former glory. Several areas of this building were in great disrepair and had environmental hazards such as asbestos and lead-based paint that needed to be addressed before rehabilitation could begin.



Twelve years ago, St. Louis city officials decided to take back the city in an attempt to revive its depressed economy. They needed to increase the city's tax base, and to do so, they would have to lure tax-paying citizens and businesses back into the city. One gleaming example of how the officials' plans did just that is realized through the work they did in the downtown Washington Avenue area. This area was known for its empty high-rise buildings and illegal activi-

ties. Once the city leaders finished work on this community, Washington Avenue was transformed into swanky loft-style apartment complexes with high-end eateries and stylish night clubs.

People were returning in droves to be a part of this new era of fashionable city living. Now, with prosperous blood returned to the city's arteries, officials decided it was finally time to bring back its heart – the opera house. The big question was how



(Top) The Peabody Lounge is an exquisitely adorned getaway. Reserved for both special events and loge box holders, the renovated lounge has many well-appointed features in the art deco style.  
(Above) Prior to the completion of the renovations, the Grand Entrance was in complete disrepair.

does one revive a 68,180-square-foot, three-story, masonry heart? The answer was found in a complex mixture of city and private funds combined with assistance from the Missouri Department of Natural Resources and the Missouri Department of Economic Development.

The definition of a brownfield property is “real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant.” The Opera House, as is, was creating such a large eyesore it certainly hindered development of the surrounding community. This scenario basically describes a brownfield property “to a T” and illustrates why redevelopment of these types of properties is vital to the health of their surrounding community.

Some of the challenges with reopening the opera house, 20 years later, were issues with asbestos-containing material, lead-based paint and miscellaneous hazardous materials. The hazardous materials were removed and disposed of. Asbestos-contain-

## THE PEABODY OPERA HOUSE

**stands as proof that with the right mixture of purpose and planning almost any area can be brought back to life.**



**Scaffolding stood in place of normal theater seating during the rehabilitation. The many decorative features in the theater required painstaking care and attention to detail to return them to their former glory.**

ing material and lead-based paint were either removed and disposed of or encapsulated.

A plan to govern inspection, maintenance and repair of all remaining asbestos-containing material and lead-based paint was filed in the chain of title for the property.

The renovation took about 1,300 crafts-men 14 months to complete. The main concert hall, two grand staircases, a grand foyer, marble columns, hundreds of glass chandeliers, lighting fixtures and terrazzo floors were all restored to their previous glory. The building was updated with new electrical wiring, heating and cooling systems, sprinklers, phones and high-speed internet lines, two elevators, state-of-the-art house-wide sound system and a completely redesigned VIP entrance.

**L**ife finally returned to the Opera House on Oct. 11, 2011, with the incomparable Aretha Franklin opening the show. Visitors were welcomed via the new VIP entrance,

under the watchful eyes of twin bear statues sculpted by St. Louis artists Jeff Metz and Chris Cassimatis.

The Peabody Opera House now books more than 200 shows a year, as well as weddings, galas, fundraisers and graduation events. It has become a key focal point for St. Louis's tourism industry and stands as proof that with the right mixture of purpose and planning, almost any area can be brought back to life.

This is the spirit behind the Brownfields Voluntary Cleanup Program; to aid in the development and reuse of properties that are key to keeping a community prosperous and to help promote a growing population. ■

*Eva Dee Goss is a former public information specialist in the Department of Natural Resources' Division of Environmental Quality. She served the Hazardous Waste Program, which houses the Brownfields/Voluntary Cleanup Program.*



# MINERALS

## *in Everyday Life*

by Hylan Beydler

**M**inerals literally are all around us. They are critical to society and they make everyday life better. Without them there would be no planes, trains or automobiles. Minerals help clean our teeth, wash our clothes and file our fingernails. Clocks, watches, jewelry, tin cans and aluminum foil – all minerals. They also are in tortilla chips, cellphones, computers and medical instruments. Minerals also are used in the defense and aerospace industries.

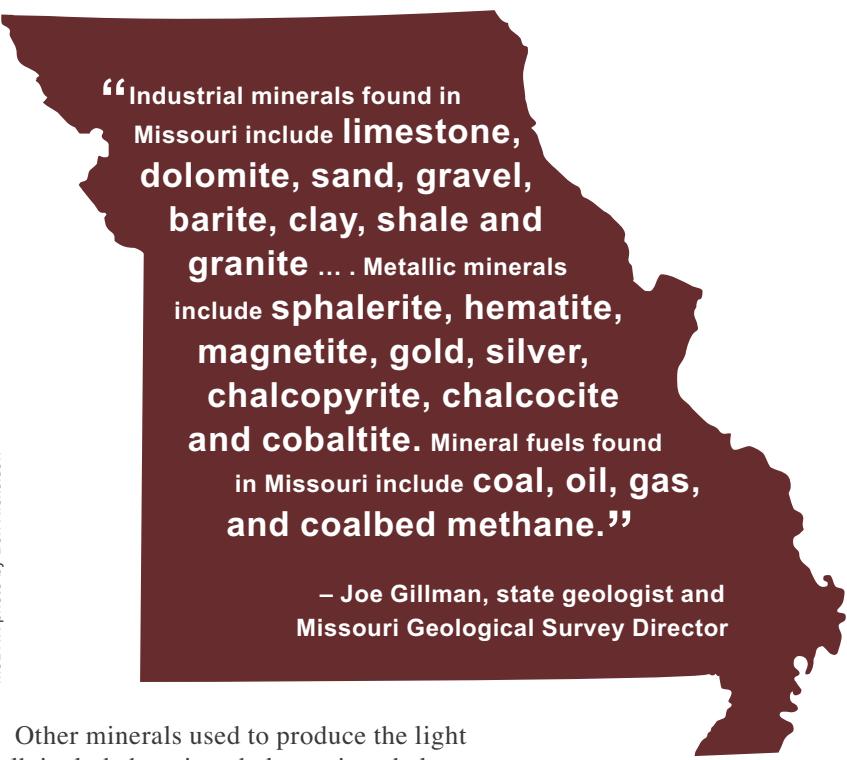
“Economic geologists categorize mineral resources as industrial or metallic minerals or mineral fuels. Industrial minerals found in Missouri include limestone, dolomite, sand, gravel, barite, clay, shale and granite,” said Joe Gillman, state geologist and Missouri Geological Survey Director, Missouri Department of Natural Resources.

There are other less familiar minerals such as basalt, rhyolite, diabase, ashflow tuff, rhyodacite, trachylite and tuff.



MoDNR photo by Ben Nickelson

(Left) From the mirror glass, lights and switches, to the toothpaste, toothbrush and ear buds, minerals are a daily part of nearly every waking moment of our lives.



“Metallic minerals include sphalerite, hematite, magnetite, gold, silver, chalcopyrite, chalcocite and cobaltite. Mineral fuels found in Missouri include coal, oil, gas and coalbed methane,” Gillman said.

By taking a look around the house, we can observe many minerals that contribute to our way of life. As we step out of bed, of which the frame and bed springs are made from hematite, magnetite, pentlandite and millerite, and make our way across the room, we place our feet on the carpet made from limestone, metal sulfide ores and petroleum products.

With a flip of the switch, composed of chalcopyrite, chalcocite, bauxite and petroleum products, we turn on the electric light. The material used to produce the glass bulb is the mineral quartz (silica sand).

Other minerals used to produce the light bulb include bauxite, chalcopyrite, chalcocite, feldspar, limestone, pyrolusite, pentlandite, millerite, halite, trona and scheelite.

**A**fter brushing our teeth with a toothbrush made from limestone, mica, talc, clays and petroleum products, and toothpaste made from limestone, apatite, gypsum, selenite, fluorite and dolomite, we make our way to the kitchen.

Once the coffee pot, which is made of glass or ceramics (silica sand, limestone, talc and feldspar), finishes doing its job, we secure that first cup (made from silica, limestone and feldspar) of coffee (coffee beans fertilized with apatite).

We pause to relax for a few minutes in our easy chair (made of petroleum and

# Around the House



MoDNR photos by Ben Nickelson

## Light Bulb

bauxite, \*calcopyrite, \*chalcocite, \*feldspar, halite, \*limestone, \*pyrolusite, pentlandite, millerite, \*quartz, scheelite, trona

## Watch

chromite, \*hematite, pentlandite, \*quartz

## Tablet

\*monazite, \*quartz, xenotime

## Tools

\*coal, \*hematite, \*magnetite

## Fireplace

\*clay, \*natural gas (a mineral fuel)

## Toaster

chromite, \*calcopyrite, \*chalcocite, \*hematite, \*magnetite, \*mica, millerite, pentlandite

\*minerals found in Missouri

source: Missouri Geological Survey

bauxite, dyes made of sphalerite and chromite and thick cushions filled with foam rubber made of sulfur) to enjoy our favorite morning wake-me-up beverage that helps us start the day.

After we finish reading the local newspaper made from kaolin clay, limestone, thenardite and trona, and have completed the crossword puzzle using our pencil whose metal band is made of bauxite or calcopyrite, chalcocite and sphalerite, we recall the heat from the fire in the fireplace that is made of brick (clay).

**L**ooking out the family room window (glass made from silica sand), we see two cardinals perched on the fence made of wire coated with sphalerite. We gaze across the room at the shiny new golf putter, made of zirconium and ilmenite, and our child's tricycle manufactured from bauxite, dolomite, graphite, ilmenite, coal, hematite, magnetite and other minerals.

Finally on our way to the shower, we glance over at the computer with a screen made of quartz, barite,

apatite, borax, lead and strontianite or celsite and lead. We pause for a moment to punch up the weather forecast on our smartphone – containing silver, chalcopyrite and chalcocite, silica, petroleum, lithium, hematite and magnetite – that rests on the granite countertop.

A quick trip to the shower made of ceramic tiles composed of silica sand, limestone, talc and feldspar, we turn on the water, softened by halite, a type of salt. We adjust the showerhead and the faucets (made from hematite and magnetite, pentlandite and millerite or chromite) for warm water, and begin the soap (talc) and shampoo (clays, lithium, coal tar and metal sulfide ores) routine. We rinse, we exit – clean and refreshed, ready to resume our day.

What is left of the coffee we poured earlier is now cold, so we warm it in the microwave made of silica, chalcopyrite, chalcocite, gold, hematite, magnetite, pentlandite and millerite; then quickly check the latest news on the television (silica, hematite, magnetite, chalcopyrite, chalcocite, bauxite, pentlandite and millerite).

When the alarm clock (manufactured from limestone, mica, talc, silica sand, clays, coal, hematite, magnetite and petroleum products) sounds to awaken the rest of the household, we are thankful our family is safe and comfortable, compliments of air conditioning provided primarily by energy derived from coal or natural gas, or possibly from propane, nuclear or wind power.

**W**e can now start our day – feeling absolutely mineralized.

A peek into these activities highlights only a few of the many minerals we rely on throughout the day – many of which our state has a long history of producing. The Department of Natural Resources' Missouri Geological Survey has been providing expertise in the area of minerals research since 1853. Learn more about Missouri minerals at [dnr.mo.gov/geology/geosrv/geores/index.html#minerals](http://dnr.mo.gov/geology/geosrv/geores/index.html#minerals).

*Hylan Beydler is division information officer for the department's Missouri Geological Survey.*

# Your Bike: A Base Camp for Minerals



# WONDROUS WILDFLOWERS



1



2



3



5



4





6



7



10



8

MoDNR photos by Ben Nickelson unless otherwise indicated

- 1 Prickly pear cactus (*summer*), Battle of Pilot Knob State Historic Site.
- 2 Wild sweet William (*spring*), Katy Trail State Park.
- 3 Bristly sunflower (*summer*), Harry S Truman State Park.
- 4 Common milkweed (*summer*), Onondaga Cave State Park.
- 5 Rose pink (*fall*), Prairie State Park.

MoDNR photo by Tom Uhlenbrock

- 6 Flowering dogwood (*spring*), Montauk State Park.
- 7 Carolina larkspur (*spring*), Mastodon State Historic Site.
- 8 Dutchman's breeches (*spring*), Rock Bridge Memorial State Park.
- 9 Sunflower (*summer*), Van Meter State Park.
- 10 Spiderwort (*spring*), Hawn State Park.



9

## National Award for Missouri State Parks Ranger

Cpl. Brandon Bartz of the Missouri State Park Rangers has been named the 2015 Park Ranger of the Year by ServiceWear Apparel. The national award is presented each year to honor a park ranger who goes above and beyond in service. The company selects the nominees based on submissions and the public can vote online for the winner.

Bartz was nominated for his actions at Castlewood State Park after a guest jumped from a cliff and became stuck 140 feet from the ground. Bartz climbed the rock face to reach the victim. Supported only by a small tree, the park ranger spent more than two



hours administering aid and offering encouragement and comfort to the victim before she was able to be extricated to safety.

## Popular Pesticide Pickups Scheduled

For the fifth year, the Missouri Department of Natural Resources will host a series of pesticide drop-off events for Missouri farmers and residents.

Six collection events will be open to all Missouri farmers and households and will take unwanted pesticides, fungicides, insecticides, rodenticides, de-wormers, fly tags and fertilizers containing herbicides or pesticides. Pesticides from businesses, pesticide



production facilities, pesticide distributors, pesticide retailers or related sources will not be accepted.

The events began March 12 in Portageville and run through the spring and early summer before ending June 25 in Bolivar. Additional host cities include Poplar Bluff, Fairfax, Canton and Montgomery City. More information on the Missouri Pesticide Collection Program, as well as a schedule, is available online at [dnr.mo.gov/env/hwp/pesticide](http://dnr.mo.gov/env/hwp/pesticide).

The Missouri Pesticide Collection Program was featured in the article "Missouri Pesticide Collection Program: Picking Up Pesky Poisons" in the Winter 2016 issue of *Missouri Resources*. The article is available at [dnr.mo.gov/magazine/docs/mr-winter-2016.pdf#page=12](http://dnr.mo.gov/magazine/docs/mr-winter-2016.pdf#page=12).

## Time Exposures

In 1869, a Dutch immigrant named Henry Tibbe, at the request of a friend, first made a tobacco pipe from a corn-cob with the lathe in his woodworking shop in Washington, Mo. It wasn't long before Tibbe was spending more time on pipes than working with wood, and began selling them in his shop. H. Tibbe and Son Co. was soon created and in 1878, the firm began coating the outside of their pipes with a proprietary plaster of Paris mixture.

In 1907, H. Tibbe and Son Co. became the Missouri Meerschaum Co., adopting the name from a type of Turkish clay known for its use in high quality smoking pipes. As many as five competitors also set up shop in Washington, one being the Phoenix American Cob Pipe Co. This photo, taken by Lewis Wickes Hine, c. 1910, depicts the child labor that was often used to make pipes in the Phoenix American factory. On the left side of the photo is a sign, barely visible, that says, "Wanted – Men and Boys."

In 1911, Phoenix American moved to Boonville after residents raised \$25,000 for the construction of a factory. Phoenix American was one of the last corncob pipe manufacturers to close, shuttering sometime in the mid-1950s. Still operating from their headquarters in Washington, The Missouri Meerschaum Co. remains as the only surviving manufacturer of corncob pipes in the United States.



Photo from the Library of Congress, Prints & Photographs Division, no. LC-USZ62-108765.

*Send your photo to "Time Exposures," c/o Missouri Resources, PO Box 176, Jefferson City, MO 65102-0176. Original photos will be returned via insured mail. Pre-1980 environmental and natural resource photos from Missouri will be considered. Please try to include the date and location of the picture, a brief description and any related historic details that may be of interest to our readers.*

## Gov. Nixon Receives Great Outdoors Award

Gov. Jay Nixon was recognized for his commitment to conservation and the outdoors as the recipient of the 2015 Sheldon Coleman Great Outdoors Award from the American Recreation Coalition (ARC), the outdoor recreation community's most prestigious award.

In presenting the award, ARC recognized the Governor's successful efforts throughout his career to enhance opportunities for outdoor recreation. Under the Governor's leadership, Missouri also has been named the best camping state, the best trails state, and its state parks have consistently ranked among the best in the nation.



## MissouriDNR Photo Contest

Amateur photographers of all ages may enter the third annual MissouriDNR Photo Contest to help showcase Missouri's rich natural and cultural resources. Winning photographs will be featured in the Winter 2017 issue of *Missouri Resources* magazine. The contest is divided into three categories:

**Natural Resources:** Includes photographs of Missouri's air, landscapes and waterways.

**Unique Places:** Includes photographs taken within one of Missouri's 88 state parks and historic sites.

**People Enjoying Missouri's Waterways:** Includes photographs of people enjoying rivers, lakes and streams throughout Missouri.

The contest runs April 1 through Sept. 1, 2016. Additional details regarding the contest are available on the department's website at [dnr.mo.gov/photocontest](http://dnr.mo.gov/photocontest). Good luck!

## New Geologic Maps Published

The Missouri Department of Natural Resources' Missouri Geological Survey recently published seven new geologic maps. Staff geologists conducted field work in central Missouri and

# OUR MISSOURI WATERS

## Watershed Wins!

When citizens think in watershed terms, they realize that many activities can work toward common goals – better health and a better environment for all. A St. Louis area Alpha Kappa Alpha sorority alumni chapter brought an idea for an electronics recycling event to the Our Missouri Waters St. Louis Regional Coordinator. In thinking big picture about how recycling can benefit area waterways and the environment, and how a healthy environment can create a healthy life, the event grew into the first annual Un-stash That Trash

event. The event was planned and held in a location to benefit an underserved population. The partner list grew to over a dozen and the services provided included multiple types of recycling, environmental and water education opportunities, and health and health care counseling. Held on Halloween 2015, the event provided a fun and educational environment, with interactive displays and costumed volunteers. Participants not only gained access to recycle a variety of items – a service not readily available in that community – they also gained knowledge about how a healthy environment truly leads to a healthier life for them and their families.



Left to right: Michael Brockman, Jessica Freiberger and Elysia Musumeci of Brightside St. Louis – City of St. Louis Recycling Program.

MoDNR photo by Stephanie Hotard



created bedrock geologic maps of the Ashland, Centertown NW, Hartsburg, Jamestown, Jefferson City NW and Millersburg SW 1:24,000-scale quadrangles. These maps were funded in part by the U.S. Geological Survey's STATEMAP component of the National Cooperative Geologic Mapping Program. The Missouri Geological Survey has participated in the program for 22 years. Also published was the Poplar Bluff 30x60 quadrangle.

Geologic maps provide a baseline for data related to energy resources, mineral resources, natural hazards, water resources, soil conservation and climate science. Virtually all mineral, energy, water, industrial construction, public works and urban de-

velopment projects can benefit from a geologic map.

These and other maps may be purchased from the Missouri Geology Store at 111 Fairgrounds Road, Rolla, or online at [missourigeologystore.com](http://missourigeologystore.com). Additionally, thumbnail versions of the 1:24,000-scale maps may be viewed at [dnr.mo.gov/geology/statemap/missouri-maps.htm](http://dnr.mo.gov/geology/statemap/missouri-maps.htm).

For news releases on the Web, visit [dnr.mo.gov/news](http://dnr.mo.gov/news).

For a complete listing of the department's upcoming meetings, hearings and events, visit the department's online calendar at [dnr.mo.gov/calendar/search.do](http://dnr.mo.gov/calendar/search.do).

Looking for a job in natural resources? Go to [dnr.mo.gov/hr](http://dnr.mo.gov/hr).

# top spots

## Top Spots for Dining

For many, state parks mean campfire cooking and picnics. However, 11 of Missouri's state parks and historic sites also have on-site dining options. Grab a quick bite at a grill or enjoy a sit-down meal at a full-service restaurant. Here are some great options for getting a hot meal after a full day of enjoying the outdoors.

### Arrow Rock State Historic Site

The J. Huston Tavern at Arrow Rock State Historic Site is known for its home-style fried chicken, which received the honor of being voted as the "Best Fried Chicken in the State" by *Rural Missouri* readers in 2011. J. Huston Tavern is the oldest continuously serving restaurant west of the Mississippi River, with 180 years of continuous service to the public. The tavern is a step back in time to the frontier heyday.

### Thousand Hills State Park

Thousand Hills State Park Lakeside Dining is a beautiful spot to grab a delicious meal. This full-service restaurant serves steaks, seafood and prime rib, as well as sandwiches and salads. While enjoying the good food, guests can enjoy the gorgeous views of Forest Lake through large picture windows along the length of the restaurant.

### Montauk State Park

All of Missouri State Parks' trout parks, Bennett Spring State Park, Montauk State Park and Roaring River State Park, include full-service dining. One spot every angler can enjoy is Montauk State Park. Inside the Dorman L. Steelman Lodge, guests can grab a variety of options. At the restaurant, guests can enjoy home-cooked meals for breakfast, lunch and dinner, including fresh bread, rolls, freshly made pies, seafood and fine steaks. At the soda fountain and snack-bar counter, guests can enjoy a meal, pick up a snack or try the hand-dipped ice cream.

For more information on dining in state parks and historic sites, visit [mostateparks.com](http://mostateparks.com).

(Top) Guests of Arrow Rock State Historic Site enjoy a family-style meal at the J. Huston Tavern.

(Middle) In addition to regular restaurant dining, Thousand Hills State Park Lakeside Dining caters to private parties with banquet seating for up to 90 people.

(Right) At the soda fountain and snack bar, Montauk State Park guests can enjoy hand-dipped ice cream cones.

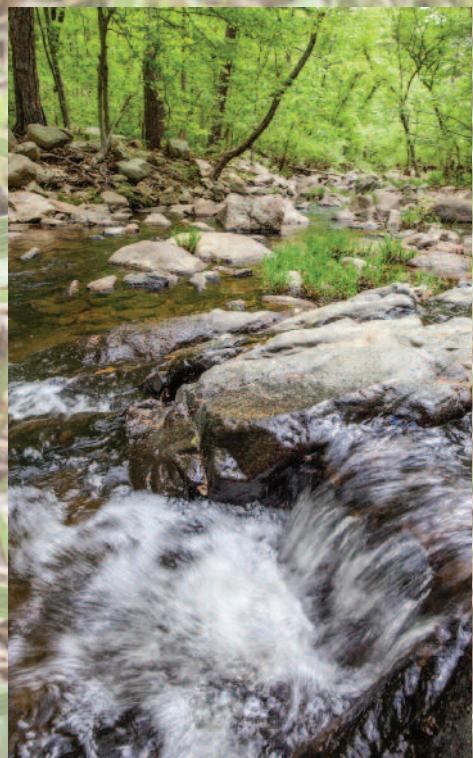


## Pickle Creek at Hawn State Park

**W**estern Ste. Genevieve County contains some of the loveliest vistas in the state, and Hawn State Park offers visitors one of the best places to experience this diverse natural landscape. See a beautiful shut-ins stream along Pickle Creek Trail, which follows Pickle Creek. The short .7-mile trail begins at the picnic area and leads hikers on a scenic journey.

Because of Pickle Creek's high quality and pristine nature, it has been designated an outstanding state water resource. This persistent stream has carved its way through the surrounding sandstone to its present course. The result is a clear, sandy-bottom creek strewn with water-sculpted granite boulders and exposed sandstone bluffs. These features make a hike along Pickle Creek Trail a pleasure any time of the year.

Hawn State Park is located in Ste. Genevieve County on State Route 144 E, approximately 20 miles west of Ste. Genevieve. For more information, go to [mostateparks.com](http://mostateparks.com).



(Above left) Pickle Creek Trail follows the beautiful shut-ins of Pickle Creek at Hawn State Park in Ste. Genevieve County.

(Above right) The rugged .7-mile trail will take roughly 40 minutes to hike, one way, and is an excellent adventure for the whole family. MoDNR photos by Ben Nickelson

# Rock Matters



## conglomerate

A sedimentary rock, conglomerate consists of pieces known as clasts of pre-existing rocks, pebbles, cobble, or boulders that are naturally cemented together in a fine-grained matrix of sand, silt, calcium carbonate, iron oxide, silica or clay.

(Left) Pre-existing rocks, rounded by the action of moving water, set within a fine-grained sedimentary matrix make up this conglomerate. MoDNR photo by Mark Gordon

**C**onglomerate forms in an environment where rocks are eroded and carried in strong water currents so swiftly that they aren't broken down into sand. They form at the base of mountain ranges, as a glacial deposit, or they may make up an ancient riverbed or coastline.

Because the rocks that make up conglomerate have been transported by water, the pebbles may be from a wide variety of rocks. After being deposited, they are compacted by sediments and over time, become cemented together by minerals. The conglomerate's rounded rock particles are larger than 2 mm in diameter, so they are easily visible to the naked eye. Conglomerate provides important clues about the ancient environment because the individual stones are samples of the older rocks that were exposed as it was forming.

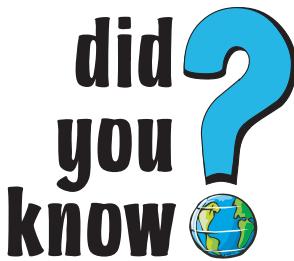
Numerous occurrences of conglomerate exist in the state. Some include the "Chariton" conglomerate, Iron Mountain Lamotte Sandstone conglomerate, Lamine River Conglomerate Physiofacies, Pilot Knob conglomerate, Potosi slates and conglomerate, Ralls Oolitic limestone conglomerate and Rockaway conglomerate.

The Graydon Conglomerate, known to occur in scattered areas in Callaway, Cedar, Greene, St. Clair and Polk counties, is composed of large rounded cobbles and boulders of Mississippian chert redeposited during the

Pennsylvanian System and cemented with silica. A similar rock type, breccia, is composed of angular fragments rather than rounded rock or mineral fragments.

The Lamotte Sandstone is commonly exposed in the St. Francois Mountains of Missouri and overlies the Precambrian igneous-rock surface. The primary contact between these units is a conglomerate composed of pieces of weathered granite or rhyolite and cemented with silica. The Dec. 14, 2005, breach of the Taum Sauk Reservoir that sent more than 1 billion gallons of water down Proffit Mountain and into Johnson's Shut-Ins State Park near Lesterville, revealed what geologists call a conglomerate "beach." The release of more than 1 billion gallons of water in approximately 12 minutes exposed an incredible amount of rock, including the evidence of the conglomerate beach as well as ancient volcanic activity. The deposit is made of sand-size granite and rhyolite grains that grade up to the size of boulders.

See conglomerate specimens on display at the Ed Clark Museum of Missouri Geology at 111 Fairgrounds Road, Rolla – open weekdays from 8 a.m. to 5 p.m. Learn more online at [dnr.mo.gov/geology/edclarkmuseum.htm](http://dnr.mo.gov/geology/edclarkmuseum.htm). Conglomerate is one of the 20 different specimens in the Missouri Rock and Mineral Set, which is available for purchase at the facility or online at [missourigeologystore.com](http://missourigeologystore.com).



## Small Steps Can Slow Landfill Growth

Solid waste landfills possess a finite amount of space, and the simplest way to reduce the amount that goes into them is to simply throw away less. Small changes to our daily habits can significantly diminish the amount of waste we send to landfills.

Some of the most common items in landfills are plastic bags, paper sacks and cardboard. These items are highly reusable, and in the case of paper sacks and cardboard, highly recyclable. To take things a step further, bringing cloth bags to the grocery store can greatly reduce the number of plastic bags we use, a very common waste, which not only end up in landfills but also get stuck in storm drains, trees and can generally be found anywhere if you look hard enough. If you get unwanted catalogs or subscriptions in the mail, cancel them. In the case of bills, request electronic billing via email to reduce the amount of paper that you put in the trash. Buy items that come with a refillable or reusable container. Laundry detergent and cleaning supplies can be purchased in concentrated form, reducing the size of the plastic packaging. Where practical, invest in durable, quality products that last, rather than disposable items intended for limited use.

Waste is an everyday part of life, but with a little effort, we all can reduce the amount that we generate. Collectively, we can slow the rate at which our landfills grow.



MoDNR file photo

... but not least



# Operator Certification

From pipe to stream, keeping our water clean

by Renee Bungart

photograph by Andrew Richmond

Water is a necessity we can't live without. We depend on an abundance of good quality water for drinking and want to be surrounded by pristine waters when we are fishing, swimming or canoeing.

For most Missourians, our water is treated through drinking water and wastewater facilities in our communities. While these facilities cost a significant amount of money to construct and operate, they are a tremendous asset to our communities and our health. Operating these facilities is a technical, complex and critical process that ensures the water delivered is safe. Federal and state agencies provide laws, oversight and assistance to ensure the water is treated properly. But who completes the "dirty work," day-in and day-out, to safeguard that these public systems are providing reliable drinking water or effectively treating wastewater? It's the certified operators.

"I began my 39-year-long career as an operator at the age of 17, and I didn't know anything starting out," said Rob Trivette, certified operator #370. "Everett Baker and staff within the department provided me with a lot of training and help over the years. Thanks to them, I better understand

the entire drinking water and wastewater treatment process."

The Missouri Operator Certification Board first began a voluntary testing and certification process for operators in the 1950s. In 1971, Everett Baker began his career as an environmental engineer responsible for ensuring facilities were distributing safe drinking water in northeast Missouri. He realized early in his career with the Department of Natural Resources that operators played a vital role in protecting health.

"Many operators were hired for minimum wage to operate a multi-million dollar facility and not provided with (adequate) training," said Baker. "We were documenting state and federal violations at drinking water and wastewater facilities that could be resolved by providing operators with specific training to properly operate these complex facilities."

Baker worked with staff to develop and implement the voluntary training and encouraged facilities to send their operators to become certified.

By 1977, the department took over the role of certifying water and wastewater operators and the once-voluntary certification became a requirement for certain wastewater facilities.

Ten years later, drinking water regulations changed as well, requiring system operators to be certified based on a classification of the systems.

Certified operators must complete continued education classes in order to renew their certificates to ensure they stay current on technological changes and regulations. Today, there are nearly 6,000 active, certified operators in Missouri. Some operators hold multiple certifications. Collectively there are more than 9,000 active certificates statewide helping to provide communities with safe water.

"The water that is sent out of the pipe into a stream is going to become someone's drinking water," said Trivette. "It's the operator's job to ensure we do a great job of treating the water. It is a huge, huge responsibility but there are huge benefits to this career. After all, we all want to drink good, quality water!"

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Renee Bungart is deputy communications director for the Missouri Department of Natural Resources.

**(Top)** Everett Baker, recently retired, was instrumental in developing and providing training to certify drinking water and wastewater operators in Missouri.

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OF NATURAL RESOURCES  
PO Box 176  
Jefferson City, MO 65102-0176

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## Pump Track and Skills Course

Finger Lakes State Park near Columbia includes the park system's first pump track. This 87-foot concrete track allows bicyclists to speed around an oval ring and over eight bumps, or "pumps," to increase speed to take on the banked curves at each end of the track. The area also includes a 12-piece skills course designed to help mountain bikers of all levels perfect their skills for mountain biking trails.



*Missouri State Parks – a division of the  
Missouri Department of Natural Resources*

